

# STEFFAN SØLVSTEN

PhD Student of Computer Science at Aarhus University

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Technophobic computer scientist, climber, dancer, psychology and philosophy interested and board game playing hippie. My PhD research is at the intersection between the areas of *formal methods*, *algorithms*, and *complexity theory*.

## PROFESSIONAL EXPERIENCE

### Academic Experience

#### PhD Student

##### Aarhus University

November 2019 – August 2024 Aarhus, Denmark

Research in the field of Formal Verification in collaboration with Prof. Jaco van de Pol as my supervisor. The aim of this project is to design I/O-efficient variants of the algorithms and data structures used in the field of Verification; this way we hope to scale our current techniques to encompass more real-life pieces of software and hardware.

#### Products of my research:

</> Adiar: External Memory Decision Diagrams

A fully-fleshed BDD library implemented in C++ allowing one to construct and manipulate Decision Diagrams, even when these vastly outgrow the memory available.

git : [github.com/ssoelvsten/adiar/](https://github.com/ssoelvsten/adiar/)

📄 : [ssoelvsten.github.io/adiar/](https://ssoelvsten.github.io/adiar/)

### Industry Experience

#### Student Programmer

##### SCALGO

May 2019 – October 2019 Aarhus, Denmark

SCALGO brings cutting-edge massive terrain data-processing technology to market, build on more than two decades of research on I/O-efficient and geometric algorithms.

As a student developer my responsibilities was to improve and maintain the frontend of the *SCALGO Live* platform.

#### Software Developer

##### IT Minds

March 2018 – April 2019 Aarhus, Denmark

Consultant providing IT solutions, that improve and automate the client's workflow. Among my clients have been *LEGO*, where I was working full stack and was the main architect on the frontend Angular application.

I was the lead architect on the frontend of an internal project, where I succesfully mentored the new interns, providing feedback on their approaches to solutions and code quality.

## EDUCATION

### BSc in Computer Science

#### Aarhus University, Denmark

August 2015 – June 2018

Graduating from Denmark's most theoretical computer science bachelor's degree.

🎓 Course Average: 11.42 (A).

📄 Bachelor's Project: 12 (A+).

### MSc in Computer Science

#### Aarhus University, Denmark

August 2019 – August 2022

Master's degree obtained as part of an integrated PhD. My choice of courses focused on *algorithmics* and *formal verification*.

🎓 Course Average: 12.00 (A+).

## SKILLS

### Interpersonal Skills

Teaching Public speaking

### Technologies

C++ Rust  $\LaTeX$  SML / OCaml Java / C#

Python Git SQL

Spring Boot Twisted TypeScript Angular React

### Theoretical Computer Science

Model Checking Formal Verification Logic

Functional Programming I/O Model Algorithms

Game Theory Complexity Theory

Proof Assistants Concurrency Distributed systems

### Mathematics

Linear Algebra Algebra Mathematical Modelling

Mathematical Analysis

## TEACHING

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### Teaching Assistant

#### Aarhus University

📅 March 2017 – August 2023

📍 Aarhus, Denmark

For a group of students I corrected their weekly assignments and organized their weekly face-to-face lessons that follow the exercises provided by the course coordinator of the following courses.

Computability and Logic

Algorithms and Datastructures

Regularity and Automata

Software Design using C++

### Supervisor

#### Aarhus University

📍 Aarhus, Denmark

I have had the pleasure to supervise the following students.

- **Erik Funder Carstensen**

📅 Fall 2023

🎓 MSc Course Project

Investigation of using BDDs in the context of Boolean Optimisation.

- **Anders Benjamin Clausen and Kent Nielsen**

📅 Spring 2022

🎓 BSc Project

Investigation of whether a prior space-efficient algorithm for BDD variable reordering could be made I/O-efficient.

- **Anna Blume Jakobsen and Mathias Weller Berg Thomasen**

📅 Summer 2020

🎓 Talent-Track Project

Implementation of the prototype that was to become the *Adiar* project.

I have also hired the following talented student programmer.

- **Anna Blume Jakobsen**

📅 Spring 2022

## INTERNATIONAL ACTIVITIES

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### Talks at International Events

- **2023** ATVA [1] (📅 October, 2023) NFM [2] (📅 May, 2023)
- **2022** TACAS [3] (📅 April, 2022) MOVEP (📅 June, 2022)
- **2020** MFCS [4] (📅 August, 2020)

### Research Visits

- **Twente University**

📅 October 2021

📍 Netherlands

Collaboration with Tom van Dijk, mapping out what to be done to integrate *Adiar* with *LTSMIn*.

- **Carnegie Mellon University**

📅 August – December 2023

📍 United States

Collaboration with Marijn Heule and Randal E. Bryant to explore the challenges in designing an I/O-efficient LRAT proof checker.

## LANGUAGES

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### English

Fluent – IELTS Academic: 8.0 (2019)

### Danish

Native

### German

Native

## REFERENCES

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### Prof. Jaco van de Pol

@ Aarhus University

✉ jaco@cs.au.dk

*PhD Supervisor*

### Ass. Prof. Kristoffer Arnsfelt Hansen

@ Aarhus University

✉ arnsfelt@cs.au.dk

*Supervisor of small project in game theory*

# GRANTS

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- **STIBOFONDEN (IT-Rejsestipendie)**

📅 February 2022

💰 40.000 DKK

# PUBLICATIONS

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In order of publication (newest to oldest).

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## Published

1. Steffan Christ Sølvsten and Jaco van de Pol.  
**"Predicting Memory Demands of BDD Operations using Maximum Graph Cuts"**.  
In: *Automated Technology for Verification and Analysis*. Lecture Notes in Computer Science (LNCS). 2023.  
doi:10.1007/978-3-031-45332-8\_4

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2. Steffan Christ Sølvsten and Jaco van de Pol.  
**"Adiar 1.1: Zero-suppressed Decision Diagrams in External Memory"**.  
In: *NASA Formal Methods*. Lecture Notes in Computer Science (LNCS). Vol. 13903. 2023.  
doi:10.1007/978-3-031-33170-1\_28

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3. Steffan Christ Sølvsten, Jaco van de Pol, Anna Blume Jakobsen, and Mathias Weller Berg Thomasen.  
**"Adiar: Binary Decision Diagrams in External Memory"**.  
In: *Tools and Algorithms for the Construction and Analysis of Systems*. Lecture Notes in Computer Science (LNCS), Vol. 13244. 2022. doi:10.1007/978-3-030-99527-0\_16.

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4. Kristoffer Arnsfelt Hansen and Steffan Christ Sølvsten.  
**" $\exists$ R-Completeness of Stationary Nash Equilibria in Perfect Information Stochastic Games"**.  
In: *Mathematical Foundations of Computer Science*. Leibniz International Proceedings in Informatics (LIPIcs), Vol. 170. 2020. doi:10.4230/LIPIcs.MFCS.2020.45.  
Pre-recorded Talk: [youtu.be/CXC2UMi6hg0](https://youtu.be/CXC2UMi6hg0).